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U. S. DEPARTMENT OF
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GROWING
BLACK LOCUST
TREES



TREES PRODUCING WOOD that is durable when used in the ground are in special demand. Among the few native trees of this kind the black locust ranks high, and it is much in demand for use as fence posts, stakes, and poles.

Black locust has a strong, spreading root system which makes it of much value in checking erosion. Probably no other forest tree is being planted so extensively on farms for erosion control. It is a legume, which in part accounts for its power of growth in lean soils and makes it actually a soil enricher.

A serious menace, however, to the growth of black locust is an insect known as the locust borer. In some regions the injury done by this insect makes attempts to grow the tree very impracticable. In other regions black locust can be grown successfully and profitably. Black locust, like most forest trees, is naturally adapted to growing in certain types of soils and situations better than others.

Before attempting to plant black locust, it is of the utmost importance that information and advice be sought from the local State forestry agencies, as a necessary supplement to that contained in this bulletin.

GROWING BLACK LOCUST TREES

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THE BLACK OR "YELLOW" LOCUST (*Robinia pseudo-acacia* L.) makes rapid growth on good soils, grows even on poor and dry soils, is easily propagated, and produces very durable wood. It is a legume and by virtue of its root nodules is a natural soil enricher. Its strong spreading root system and rapid development give it first place among all trees in ability to check erosion in gullies and on steep hillsides. Its very durable wood makes it widely sought and used for fence posts, stakes, and poles.

The black locust has a dangerous insect enemy known as the black locust borer. The menace of this insect should be carefully considered before choosing black locust as a tree to plant or deciding on the manner of planting. Accompanying shipments of young locust trees from the Eastern States, the locust borer has been introduced into many of the States of the Rocky Mountain region and is there rapidly becoming a serious pest. It is present almost everywhere that black locust is grown, except in some of the States of the extreme West.

WHERE BLACK LOCUST GROWS

Black locust is found widely over the United States, especially in the eastern half. Its native or original home, however, was probably in the Appalachian Mountains, including the outlying piedmont region, where it grew singly or in small groups among other hardwood trees.

Black locust is generally recommended for planting from southern New England through New York and Pennsylvania, south to Georgia, and west as far as Illinois, Missouri, and Texas. The brown loams and well-drained areas in the lowlands of the central Mississippi Valley and limestone soils generally, are particularly favorable for its rapid growth. Exceptions appear to be portions of Ohio and Indiana. Black locust has spread over the Arkansas-Missouri-Oklahoma uplands. Under irrigation it is proving successful and valuable in many parts of the Western States.

In certain regions the climate seems to be unfavorable for the growth of locust. Northern New England and most of the Lake States appear to be too cold for successful commercial plantations and most of the southern coastal plain too hot. Serious losses from the locust borer have been reported from various places in Pennsylvania, from the low country of the Ohio River Valley and other parts of Ohio and Kentucky, from all of Indiana, and from parts of the Iowa-Missouri region. However, locust is successfully grown in

coal strippings in eastern Ohio, and the State forestry agencies of Illinois are recommending the planting of locust.

Black locust is seldom found and should not be planted in very sandy or in very acid or poorly drained soils. (Fig. 1.) It grows best on sweet or nonacid soils. In its ability to grow on well-drained locations such as on banks and hillsides black locust ranks high among all native trees.

USES OF THE WOOD

The wood is heavy, hard, and very durable. For durability in the ground the wood ranks higher than that of all other native trees except Osage-orange, or bois d'arc ("bow-dark"). It is extensively used for fence posts, the heartwood lasting from 15 to 30 years and sometimes more than 50 years. Other uses are for grape stakes, poles, insular pins, and treenails for ship building. The trunk is nearly all heart-



FIGURE 1.—Growing alone in the open, black locust makes a well-shaped tree with branches that droop at the ends. It is handsome when in full bloom

wood, which is formed comparatively early in the life of the tree. It is good practice to peel the bark before using the wood for posts or poles. (Figs. 2 and 3.)

USE OF BLACK LOCUST TREES FOR CHECKING EROSION

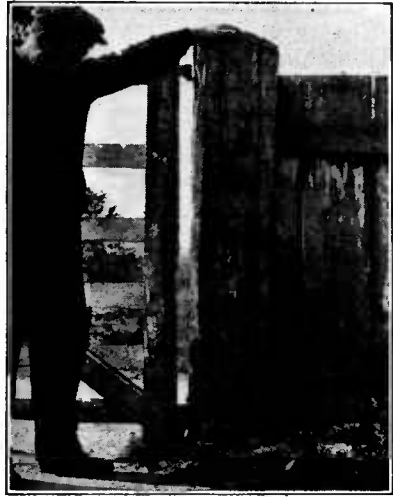
Widely known as a tree of exceptional value for checking soil washing, black locust has come to be used in many regions for that purpose. It is often seen growing naturally on steep banks along

roadsides or on railroad cuts and fills. Often it is the only tree found in such places. It reproduces itself freely from root suckers as well as from stump sprouts.

The most extensive plantings for checking erosion are to be found in the brown loam soils over western Tennessee. In cooperation with landowners the State forest service has assisted in the reforestation of several thousand acres. These landowners, as demonstrators, have assisted many other owners in stopping soil washing and gullying on their lands. (Fig. 4.)

GROWTH

The rate of growth of black locust varies widely in different soils and climates in the United States—varying all the way from extremely fast to very slow. Much depends also upon the spacing or tree density on the ground. Open-spaced trees grow more rapidly in diameter than closely grown trees. Where trees are not badly injured by the black locust borer and the soil and climate are favorable the growth should average from one-quarter to one-half inch a year in diameter after the first five years or so, and from 1 to 2 feet in height.



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FIGURE 2.—Black locust wood is hard and exceptionally lasting when in the ground. For fence posts it is the farmer's best friend. This 14 by 14 inch locust post was in good condition after 55 years of service.



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FIGURE 3.—For use in making fence posts, stakes, insulator pins and treenails, black locust is in good demand

Under such conditions it is a fast grower and yields fence posts in 10 to 20 years. In poor soils, including subsoils in borrow pits and on badly eroding slopes where locust often spreads naturally,

growth is usually slow. In any situation black locust is a tree species that reaches commercial maturity comparatively early, and should be cut usually before it is 20 to 25 years old. Under unfavorable conditions trees and stands after reaching an age of 15 to 20 years are often injured badly by insects and by heart-rot disease or fungus. Trees live for 50 or more years in good soils and favorable regions before showing signs of old age.

In well-spaced stands on average-quality farm soil within the region of fair to good growth, the trees may be expected at 15 years

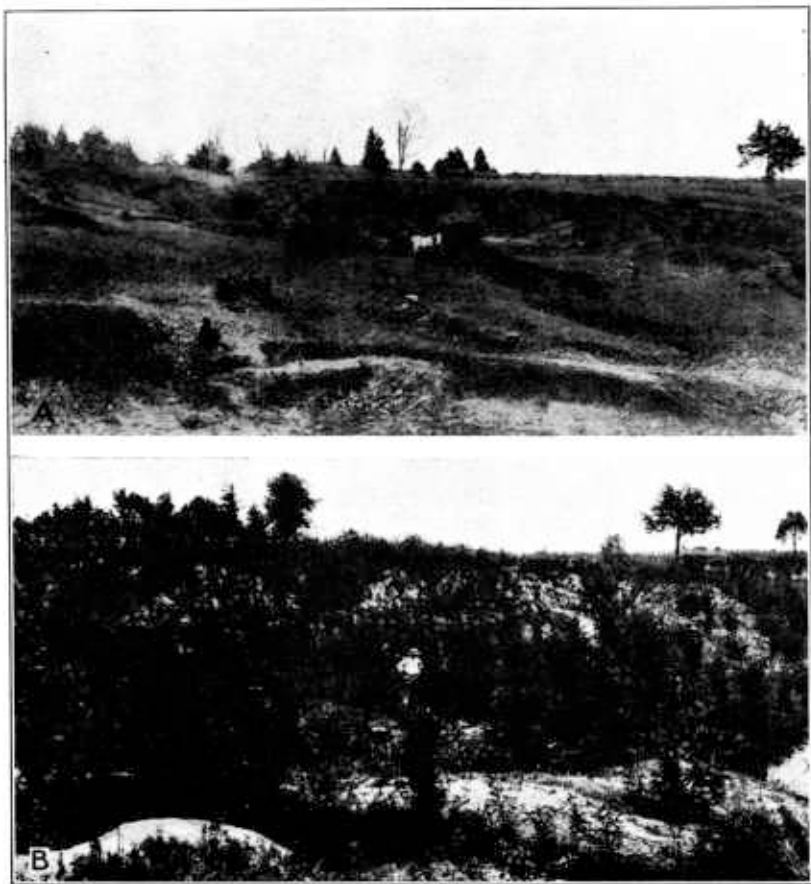


FIGURE 4.—For holding soil against erosion, black locust has no tree rival. Its strong, spreading root system and rapid growth give black locust first place for planting as a soil binder on steep hillsides and in eroding gullies: A, Before planting; B, after planting black locusts

of age to reach average heights of 20 to 30 feet and diameters (outside the bark at breastheight) of 3 to 5 inches; and at 20 years, diameters of 4 to 7 inches. In overcrowded stands or in poor locations the trees may be expected to be smaller, while in favorable situations they will usually be even larger.

One of the essentials of good soil for growing locust is the presence of nitrifying bacteria, as indicated by the abundance of nodules on

the roots. These bacteria seem to have a direct bearing upon the extent of attack by the locust borer. In places where the roots show relatively few nodules, the insect infestation is more serious than in places where the root nodules are abundant. Additional information about growth is needed for different regions.

PLANTING BLACK LOCUSTS

The planting of black locust is recommended on good soils within the favorable regions above described. For the purpose of checking erosion it may be planted on poorer soils. The planting of black locust involves a risk of some damage and, in some regions, of serious loss because of the locust borer. In this connection too much emphasis can not be laid upon the desirability of getting the advice of the State forester of the State forestry organization, or of the State extension forester who is connected with the agricultural extension service. By interplanting with other and heavy-foliaged trees, or by close spacing and good cultivation, black locust can often be grown with fair success in insect-infested regions. The secret apparently lies in heavily shading the tree trunks, thus creating un-

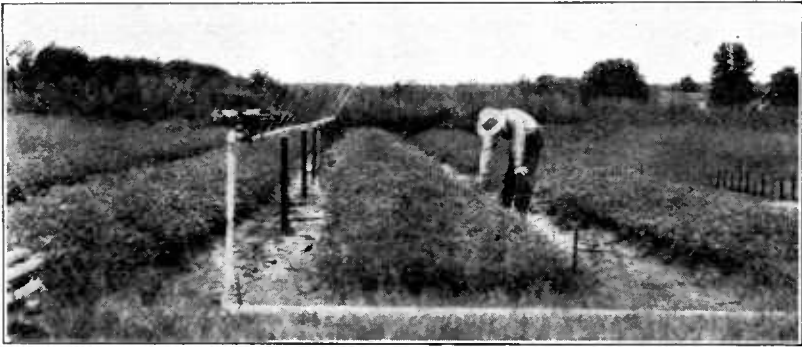


FIGURE 5.—Nursery beds of 1-season-old black locust seedlings. The pipe system is for watering in dry periods, which is not necessary in ordinary farm practice. (State Forest Service, Tennessee)

favorable conditions for the borer, which normally attacks portions of the tree exposed to direct sunlight.

HOW TO GET YOUNG TREES FOR PLANTING

The black locust produces good seed in abundance. It also sprouts vigorously after being cut or killed back by fire. Thus, it is easy both to start a tract of young trees and to get another generation of trees following cutting. Planting may be done with rooted sprouts or seedlings.

Young trees may be dug up in locust thickets or grown from seed in nursery beds at home, or purchased from State or private nurseries. Some of the State forestry departments are growing black locust seedlings for distribution at practically the cost of production. (Fig 5.)

Many locust plantations have been started with "wild" or dug-up sprouts. The method usually requires considerable labor, but it

takes one year less than the method of raising seedlings in nursery beds. It is, however, an easy matter to sow the seed in a garden and after one season have a supply of vigorous seedlings ready for planting. If seedlings are not available for purchase at a fair price, sowing seed in the garden will likely be the most satisfactory method of obtaining a supply. The seeds are contained in small pods and should be collected from the trees in the fall and kept stored over winter in a cool, dry place. Lists of dealers handling seed or seedlings will be supplied upon request by the various State forestry agencies or by the Forest Service, United States Department of Agriculture.

GROWING SEEDLINGS AT HOME

In the early spring the seed may be sown about 1 inch apart in drills in well-pulverized garden soil. One method is to make the drills in a prepared bed, spaced about 18 inches apart so as to allow for easy hoe cultivation. The seeds are then covered with about one-half inch of soil, which should be firmed to prevent rapid drying. As with other legumes, such as alfalfa and clovers, it is advisable, where possible, to get some soil from a black locust thicket with which to inoculate the nursery beds. It should be evenly scattered and raked in well before the locust seeds are sown.

There are about 26,000 seeds in a pound, or sufficient to sow about 2,000 linear feet of drill. As a rule practically all the seeds are fertile. Because of the hard outer seed coat, it has been common practice before sowing to treat the seed with hot water, as quicker germination has seemed to result. The seed might be put into water somewhat below the boiling point (near 160° F.) and allowed to soak in cooler water for about 20 hours, the water being kept warm on the back of a stove. In wet spring weather good germination has been obtained without this treatment.

The growing seedlings should be kept clean of weeds and the soil should be cultivated. By fall, when ready for transplanting, they should be mostly from 2 to 3 feet high. This is a desirable range of sizes, but some of the trees may reach over 3 feet in height, in which case they should be cut off near the ground before being planted.

HOW TO SET BLACK LOCUST

The best time for planting or setting locust seedlings or sprouts is in the early spring before the buds begin to swell. They may be planted, however, in the fall after good rains have wet the ground to a considerable depth. If set out late in the spring after leafing starts, the seedlings should be cut back to near the ground.

In advance of planting, the soil should be well prepared—if possible, plowed and disked or harrowed, and also furrowed. In recently abandoned fields, the soil preparation is comparatively easy. If the planting is to be done in rough land such as gullies, the tops and banks of the gullies should be plowed or broken off so as to furnish an abundance of loose soil in which to set the small trees. As an aid, brush dams should be built at favorable places in the gullies or in the gully system. All of this preparation requires work, but

it is well worth the effort as good growth seldom follows when trees are set in firm clay banks.

Effective brush dams in gullies require care in their making. Use scrubby or low-grade trees and cut the limbs and trunks into lengths of 4 feet or more depending upon the width of the gully. Place these across the gully. Also place some long branches lengthwise of the gully with the tops upstream. Build a compact structure and weight it down with heavy tree-trunk sections or with rocks. If necessary drive stakes through the brush and limbs to secure the dam in time of flood. The best time to make dams is in the summer when trees are in leaf. Dams built in the summer or fall should make a good catch of soil in which to set locust seedlings the following spring. Cut no trees near the gullies as their living roots will be of much value in checking erosion.

SPACING THE TREES

An average good spacing for setting locust seedlings or sprouts is 6 feet apart each way; but on eroding lands where a soil binder is especially desired it is suggested that the trees be set either 5 feet or 4 by 6 feet apart. These several spacings require 1,210, 1,742, and 1,810 trees, respectively, per acre. The richer and moister the soil within certain limits, the quicker the trees develop and their root systems and their tops meet.

PLANTING

The small trees are set much like cabbage or tomato plants. The roots should be kept moist at all times and the trees set firmly in the ground with their roots spread out and not bunched.

In unplowed soil the trees are usually set in holes dug with a mattock, hoe, or spade. In loose soil that has been furrowed, a tree that is being planted is held in the normal position while the dirt is drawn in around it and firmed with the foot. In unplowed light or loose soil free from stone, the slit method may be advantageously used. A wedge-shaped slit is opened by using a mattock, spade, or dibble which is inserted and moved back and forth. A tree is held in this opening and the soil pressed together and firmed around the tree by the foot or with the planting tool. Although not usually as good a method for getting the roots well placed, this is a rapid and often a satisfactory method.

PURE OR MIXED PLANTING

Black locust might be planted alone or in pure stands in gullies or other unfavorable places. Elsewhere, it is advisable to plant as a filler about an equal number of some slower-growing trees with heavy foliage. The purpose is to produce a good shade on the trunks of the locusts and on the ground to help keep out the locust borer and conserve the soil moisture. Various trees can be recommended for different regions, such as sugar maple, red oak, yellow poplar, ash, and basswood or linden. The filler tree might be regularly alternated with the locust or planted in alternate rows. In regions where the black locust borer is not a serious pest, and in good quality soils where growth will be rapid, a planting of locust alone may be expected to give satisfactory results. (Fig. 6.)

CULTIVATION AND CARE

It pays to keep the planted trees well cultivated at least for the first year. In the dry Great Plains, cultivation might well be kept up for a longer period. If it is not at all practicable to cultivate, the individual trees should be kept free of competing weed growth and the soil around the trees kept loose as a protective mulch.

The pruning of side branches produces cleaner trunks, but it admits more sunlight to the trunks, which increases the chance of insect attack and injury. In regions of considerable danger from serious insect injury, it is probably bad practice to prune trees. In

other regions the lowest side branches might be successively pruned each midsummer for a few years. Dead branches should be cut away.

All livestock except possibly chickens should be excluded. Cattle and horses as well as sheep and goats browse freely on the locust branches and often break down young trees. Care should be exercised at all times to keep fire from running over the ground. Insects readily attack trees where fire has run over the ground or scorched the trees.

Some planted stands after the first two years or so appear to become stagnated in growth. Such stands can usually be brought back to vigorous growth by cutting every tree off in early spring a few inches



FIGURE 6.—Extraordinarily vigorous growth of black locust on drained lands in the Mississippi lowland region of eastern Arkansas. When $2\frac{1}{2}$ years old (from seed) the trees are 10 to 15 feet in height

above the ground. The resulting sprouts often grow from 4 to 8 feet the first year. All but one of the group of sprouts from each stub should be cut out the first midsummer.

THE LOCUST BORER

A sun-loving species of insect known as the locust borer is a serious enemy to the black locust. Because of this borer many locust plantations have been seriously injured and some completely destroyed and abandoned. On good soils or locations of more vigorous growth, where weeds, underbrush, or other trees produce sufficient shade on the trees' trunks, usually little or no borer injury occurs. In the Pennsylvania-Virginia region, younger trees are more severely in-

jured than older ones, particularly trees 2 to 3 inches in diameter. After the trees have reached a diameter of 5 to 6 inches the injury is confined largely to the branches. (Fig. 7.)

Since the borer is notably a sun-loving insect it is desirable to provide shade for the tree trunks so far as possible by allowing trees to grow thick on the ground. Weeds and vines often afford the desired shade and are very helpful. In the region about the District of Columbia, for example, many locust thickets are well shaded with dense climbing growth of honeysuckle vines. Such groves are found to be only slightly infested.

The adult borers are handsome beetles, about one-half inch long, black with yellow stripes, and with long "horns" or antennæ. They are most frequently seen in late summer or early fall, feeding on the pollen of the goldenrod. The eggs, which they lay in bark crevices, hatch into larvæ or grubs which live over winter hidden in the inner bark. In the spring these larvæ begin to burrow actively and feed vigorously on the wood of the tree, continuing to do so until they pupate in July or August.

No practicable control measures are known for treating infested forest plantations. However, treatment for killing or controlling the borer on individual trees, such as those planted on lawns or streets, may be practicable. One of the simplest treat-

ments is to spray with sodium arsenite, after dissolving 1 pound in 10 gallons of water. The solution must not be allowed to touch any green leaves of trees, shrubs, or grass, for it will quickly kill them. It is harmless to the bark of the tree. The only time when spraying is effective is in the spring, when the young leaves are unfolding. During this period the young larvæ are beginning to bore into the wood. Patches of fresh wood dust, or "sawdust," may be seen between the bark plates on the trunk or branches. The above spray will kill the larvæ of the borer. The only spraying practicable is very careful handwork on highly prized individual trees.



FIGURE 7.—Because of the attractive flowers, many locust trees are spared and become decrepit veterans. The black locust grows rapidly and matures earlier than most timber trees

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THE LOCUST LEAF MINER

In midsummer or early fall the foliage of black locust trees generally turns from its usual light green to a threatening brown. A close examination will show little left but the veins or skeletons of the leaves. The green matter, or chlorophyll, has been eaten by an insect called the locust leaf miner. The effect is to retard the growth of the tree slightly, but nothing more serious. It is not practicable to attempt to check the insect.



FIGURE 8.—Fifteen-year-old black locust plantation in Cayuga County (near Ithaca), N. Y. The smaller trees are marked for cutting, which will leave a stand of trees at the rate of 332 per acre. The plantation is regarded as very successful

CUTTING THE TREES

The trees should be cut during the period from late fall to late winter, in order to promote vigorous sprouting. The sprouts which grow following midsummer cutting do not usually become sufficiently hardened to withstand the winter freezings. It is also important to cut low stumps, a few inches above the ground.

It is only the heartwood of black locust that is extremely durable in contact with soil. The sapwood decays more rapidly. For use as posts or poles, therefore, trees should preferably not be cut at such an early age or in such small sizes, that a large proportion of the wood is sapwood. By the time the tree is 6 to 8 inches in diameter on the stump it usually has enough heartwood to warrant cutting. Such trees commonly can be grown in about 15 years where soil and climate are favorable (fig. 8) or in 20 years in less favorable

places. Smaller and younger trees when cut in making thinnings to improve the growth of the stand will of course become available for use.

There is a widespread habit of allowing black locust trees to grow much beyond their age of maturity, which is often 20 to 30 years.

The trees from the second generation, or sprout crop, will grow faster and can be harvested at least five years sooner than those of the original seedling crop. (Fig. 9.) They are less subject to insect



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FIGURE 9.—Black locust grows well in limestone soils. Groups of trees like this in West Virginia on outcroppings are making an excellent return on the investment

attack than trees of seedling origin. To cut the crop of trees would often prove a good means of renewing badly infested stands of black locust.

PRODUCTION AND PROFIT

It is doubtful whether as large net money profits per acre have been derived, in periods of 10 to 20 years, from the growing of any other forest-tree species, as those that are known definitely to have accrued from the growing of black locust. These are mostly from \$7 to \$10 an acre yearly but range up to more than \$20. (Fig. 10.)

All such examples are taken from stands grown in good soils or in regions naturally favorable to the trees. (See pp. 1 and 2.) On the other hand, cases of utter failure are numerous, although confined mostly to instances where the tree was grown under conditions or in a region known to be generally unfavorable.

In parts of Pennsylvania, West Virginia, Kentucky, and Indiana, for example, which are generally supposed to be in the favorable



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FIGURE 10.—This 20-year-old black locust grove was started by planting year-old seedlings on a worn-out and gully-ing field. It contains 1,880 posts per acre, worth 10 cents in the tree or \$188 per acre. This is an average yearly gross income of \$9.40 per acre

range of black locust, there have been conflicting reports regarding the success and profit in growing black locust.

The value of black locust trees consists in binding the soil and, in many instances, checking erosion, making them very profitable. It is known that a crop of locust trees enriches the soil in much the same manner as a crop of alfalfa or crimson clover. The flowers are a source of large amounts of honey of good quality.

The increasing scarcity of chestnut for posts, poles, and stakes has done much to stimulate interest in the possibilities of growing

and in the planting of locust. The expansion of the livestock business, including dairying, calls for greater numbers and better kinds of posts. The interest in black locust has been growing in the face of the risk involved at all times because of the widespread presence of the locust borer.

FURTHER INFORMATION

In considering the question of planting land to black locust trees, or growing them, it is very advisable to consult your State forestry department, your agricultural extension service, your agricultural county agent, who is the local representative of the State college of agriculture, or the Forest Service, United States Department of Agriculture. These agencies are in a position to offer advice and give to the States assistance in securing tree seeds or seedlings.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

April 26, 1930

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